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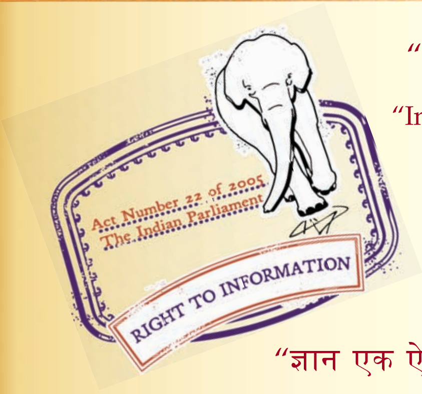

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SPECIFICATION FOR CUPROUS OXIDE DUSTING POWDER

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MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 4

November 1960

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SPECIFICATION FOR CUPROUS OXIDE DUSTING POWDER

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Indian Standard

SPECIFICATION FOR CUPROUS OXIDE DUSTING POWDERS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 9 October 1960, after the draft finalized by the Pest Control Products Sectional Committee had been approved by the Agricultural and Food Products Division Council and the Chemical Division Council.

0.2 Cuprous oxide dusting powders containing varying percentages of cuprous oxide, technical, are largely used as fungicides for the control of plant diseases in agriculture and horticulture.

0.3 Taking into consideration the views of producers, consumers, testing authorities and technologists, the Sectional Committee responsible for the preparation of this standard felt that it should be related to the manufacturing and trade practices followed in the country in this field.

0.4 This standard requires reference to the following Indian Standard Specifications:

*IS : 264-1950 NITRIC ACID

*IS : 265-1950 HYDROCHLORIC ACID

*IS : 296-1951 ANHYDROUS SODIUM CARBONATE, PURE AND ANALYTICAL REAGENT

IS : 323-1959 RECTIFIED SPIRIT (*Revised*)

*IS : 460-1953 TEST SIEVES (WITH AMENDMENT NO. 1, NOVEMBER 1955)

IS : 1070-1960 WATER, DISTILLED QUALITY (*Revised*)

IS : 1682-1960 CUPROUS OXIDE, TECHNICAL (FUNGICIDAL GRADE)

0.4.1 Wherever a reference to any Indian Standard mentioned under **0.4** or otherwise, except IS : 460-1953, appears in this specification, it shall be taken as a reference to the latest version of the standard.

0.5 This standard is one of a series of Indian Standards on pesticides and their formulations. Other standards in this series cover BHC, DDT, dieldrin, aldrin, endrin, copper oxychloride and their formulations; lime sulphur solution; pyrethrum extracts; nicotine sulphate solution; zinc phosphide; 2,4-D-Sodium; BHC smoke generators; fumigants like ethylene dichloride carbon tetrachloride mixture, ethylene dibromide, methyl bromide; and common names for pesticides.

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*Since revised.

0.6 Metric system has been adopted in India and all quantities and dimensions appearing in this standard have been given in this system.

0.7 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960 Rules for Rounding Off Numerical Values (*Revised*). The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

0.8 This standard has been prepared to facilitate the supply of the material of a quality most suitable for use under subtropical and tropical conditions. It is intended chiefly to cover the technical provisions relating to cuprous oxide dusting powders, and it does not include all the necessary provisions of a contract.

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1. SCOPE

1.1 This standard prescribes the requirements and the methods of test for cuprous oxide dusting powders containing varying percentages of cuprous oxide, technical.

2. SAMPLING

2.1 Representative samples of the material shall be drawn as prescribed in Appendix A.

2.1.1 *Sampling During Production* — Following a given order for the production of the material, the purchaser, if he so desires, shall have the right to draw samples of the material during the manufacture of each batch at the time of packing the material in the containers before sealing them. Such samples too shall be drawn as prescribed in Appendix A.

3. REQUIREMENTS

3.1 Description — The material shall be in the form of powder. It shall be free flowing and devoid of hard lumps; the cuprous oxide, technical, used in its manufacture shall have been properly extended in the filler. The material when dusted from a hand rotary duster shall issue freely without clogging or bridging.

3.1.1 Cuprous oxide, technical, used in the manufacture of the material shall conform to IS : 1682-1960.

3.2 Colour — The colour of the material shall be subject to an agreement between the purchaser and the vendor.

3.3 Physical — The material shall comply with the following physical requirements.

3.3.1 *Sieving Requirement* — Not less than 90·0 percent by weight of the material shall pass through IS Sieve 8 (aperture 75 microns) when tested by the method prescribed in Appendix B.

NOTE — In case IS Sieve 8 (conforming to IS : 460-1953) is not available, BS Test Sieve 200, *ASA Test Sieve 200 may be used. For more detailed information, reference should be made to IS : 460-1953.

3.3.2 *Density After Compacting* — When tested by the method prescribed in Appendix C, the compact density of the material shall be not greater than 2·0 g/ml.

3.4 Chemical — The material shall comply with the following chemical requirements.

3.4.1 *Copper Content* — When determined by the method prescribed in Appendix D, the observed copper content, percent by weight, of any of the samples shall not differ from the nominal value by more than the tolerance limits indicated below:

Sl No.	*Nominal Value, Percent*	*Tolerance Limit, Percent*
i)	Up to 10	$^{+10}_{-5}$ of the nominal value
ii)	Above 10 and up to 50	± 5 ,,
iii)	Above 50	$^{+5}_{-3}$,,

3.4.1.1 The actual value of the technical material in the formulation shall be calculated to the second decimal place and then rounded off to the first decimal place before applying the tolerances given above.

3.4.2 *Total Soluble Alkali* — When determined by the method prescribed in Appendix E, the alkalinity calculated as sodium carbonate shall be not more than 0·1 percent by weight.

4. TESTS

4.1 Tests shall be carried out as prescribed in appropriate appendices in **3.3.1**, **3.3.2**, **3.4.1** and **3.4.2**.

4.2 Quality of Reagents — Unless specified otherwise, pure chemicals and distilled water (*see* IS : 1070-1960) shall be employed in tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the experimental results.

---

*The series of ASA Test Sieves is the same as that of the American Society for Testing Materials (ASTM).

5. PACKING AND MARKING

5.1 Packing — The material shall be packed in double hessian bags with a polyethylene liner of not less than 10·062 mm (250 gauge) thickness.

5.2 Marking — The following information shall be marked legibly and indelibly on each container:

a) Name of the material,
b) Nominal copper content,
c) Name of the manufacturer,
d) Date of manufacture,
e) Batch number,
f) Net weight of contents, and
g) The minimum cautionary notice worded as under:

'Plant Protection Products'

'Keep far apart from foodstuffs. Do not use this container for any other alternative purpose except for storage of pesticides.'

5.2.1 The pictorial marking for 'USE NO HOOKS. DO NOT PUNCTURE.' as contained in IS : 1286-1958 Pictorial Markings for Handling Instructions for Non-dangerous Goods (*since superseded*) shall be stencilled on the bags.

5.2.2 The containers may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

APPENDIX A

(*Clauses* 2.1 *and* 2.1.1)

SAMPLING OF CUPROUS OXIDE DUSTING POWDERS

A-1. GENERAL REQUIREMENTS FOR SAMPLING

A-1.0 In drawing, preparing, storing and handling samples, the following precautions and directions shall be observed.

A-1.1 Sampling instruments shall be clean and dry when used.

A-1.2 Precautions shall be taken to draw the samples in a manner so as to protect the samples, the material being sampled, the sampling instruments and the containers for samples from adventitious contamination.

A-1.3 The samples shall be placed in clean and dry glass containers.

A-1.4 The sample containers shall be sealed air-tight after filling and marked with full details of sampling, date of manufacture, name of the manufacturer and other important particulars of the consignment.

A-1.5 Samples shall be stored in such a manner that the conditions of storage do not unduly affect the quality of the material.

A-2. SCALE OF SAMPLING

A-2.1 Lot — All the containers in a single consignment of the material drawn from a single batch of manufacture shall constitute a lot. If a consignment is declared to consist of different batches of manufacture, the batches shall be marked separately and the groups of containers in each batch shall constitute separate lots.

A-2.2 Gross Sample — For the purpose of drawing samples for test, a number of containers shall be selected at random from a lot. This number of containers in relation to the size of the lot, or the scale of sampling, shall be subject to an agreement between the purchaser and the vendor. As a guide to such an agreement, a scale of the size of the sample is suggested in Table I.

TABLE I MINIMUM NUMBER OF CONTAINERS TO BE SELECTED FOR SAMPLING FROM VARIOUS SIZES OF LOTS

Lot Size	Sample Size	Lot Size	Sample Size
2 to 8	2	1 332 to 1 728	12
9 ,, 27	3	1 729 ,, 2 197	13
28 ,, 64	4	2 198 ,, 2 744	14
65 ,, 125	5	2 745 ,, 3 375	15
126 ,, 216	6	3 376 ,, 4 096	16
217 ,, 343	7	4 097 ,, 4 913	17
344 ,, 512	8	4 914 ,, 5 832	18
513 ,, 729	9	5 833 ,, 6 859	19
730 ,, 1 000	10	6 860 ,, 8 000	20
1 001 ,, 1 331	11		

A-3. TEST SAMPLES AND REFEREE SAMPLE

A-3.1 Preparation — To prepare a set of test samples, draw with an appropriate sampling instrument small portions of the material from different parts of each container in the gross sample, selected and freshly opened for sampling. The composite sample prepared by mixing the portions from each container shall be about 450 g. Divide this composite sample into three reduced samples. Each set of these reduced samples shall constitute the test sample.

A-3.2 Three sets of test samples, not less than 140 g each, representative of each container selected for sampling, shall be transferred immediately to thoroughly cleaned and dried bottles which shall be sealed air-tight. These shall be labelled with all the particulars of sampling given under **A-1.4**. One set of the test samples shall be sent to the purchaser and one to the vendor.

A-3.3 Referee Sample — The third set of the test samples, bearing the seals of the purchaser and the vendor, shall constitute the referee sample, to be used in case of dispute between the purchaser and the vendor. It shall be kept at a place agreed between the purchaser and the vendor.

A-4. TESTS FOR COMPLIANCE

A-4.1 Examination and Tests — The purchaser may examine and test separately each of the reduced samples constituting a test sample for compliance with the requirements of this standard. If any of the samples in a lot fails to comply with any of the requirements given under **3**, the lot shall be considered as not conforming to this standard.

APPENDIX B

(*Clause* 3.3.1)

TEST FOR SIEVING REQUIREMENT

B-1. APPARATUS

B-1.1 Test Sieve — IS Sieve 8 (aperture 75 microns), prepared for test by removing any film, grease or other water repellent material and then drying.

B-2. PROCEDURE

B-2.1 Weigh accurately 10·00 ± 0·05 g of the material and transfer it to the IS Sieve 8. Cover the sieve and screen the material in a Ro-tap or similar machine for 20 minutes. Two small square rubber cubes are introduced along with the material on the sieve to facilitate the breaking up of any soft lumps of caked material. After 20 minutes, stop the machine and brush the residue on the sieve into a tared weighing dish. Weigh the dish and determine the weight of the residue.

B-3. CALCULATION

B-3.1 Material passing through IS Sieve 8, percent by weight $= \frac{100 (1 - \omega)}{W}$

where

ω = weight in g of the material retained on IS Sieve 8 (aperture 75 microns), and

W = weight in g of the material taken for the test.

APPENDIX C

(*Clause* 3.3.2)

DETERMINATION OF DENSITY AFTER COMPACTING

C-1. APPARATUS

C-1.1 Tared Measuring Cylinder — of the following specifications:

Capacity	100 ml
Graduations at every	0·5 ml
Internal diameter	2·7 to 2·9 cm

C-1.2 Funnel — with a wide mouth and stem of not more than one centimetre in length.

C-1.3 Felt Pad — about 0·5 cm in thickness.

C-2. PROCEDURE

C-2.1 Rest the funnel over the top edge of the tared measuring cylinder. Very gently pour the material through the funnel into the cylinder without tapping, till the material in the cylinder just touches the 100-ml mark. Remove the funnel and very gently level the surface of the material in the cylinder with the help of a paper strip, a camel hair brush or a feather. Leave the cylinder untouched for 5 minutes. If it is necessary to add some material in the cylinder so as to bring the level of the material to 100-ml mark, add it very gently again through the funnel and finally level the surface of the material as before. Weigh the filled cylinder and find out the weight of the material inside the cylinder. Fit an air-tight cork to the filled cylinder containing the material, taking care that the lower surface of the cork does not touch the 100-ml mark. Place the felt pad on a hard surface and drop on to it vertically the corked cylinder 20 times from a height of 15 cm. Leave the cylinder untouched for five minutes. If necessary, level the surface of the material as before, and note the volume of the material after compacting.

C-3. CALCULATION

C-3.1 Density of the material after compacting, expressed as g/ml $= \frac{W}{V}$

where

W = weight in g of the material taken for the test, and

V = volume in ml occupied by the material after compacting.

APPENDIX D

(*Clause* 3.4.1)

DETERMINATION OF COPPER CONTENT

D-1. PRINCIPLE OF THE METHOD

D-1.1 Copper is determined by titration of the iodine liberated on addition of potassium iodide to the weak acidic solution. Difficulties with absorption of iodine on the cuprous iodide precipitate are avoided by the addition of potassium or ammonium thiocyanate.

D-2. REAGENTS

D-2.1 Nitric Acid — sp-gr 1·42 (conforming to IS : 264-1968*).

D-2.2 Urea

D-2.3 Sodium Carbonate — anhydrous (conforming to IS : 296-1965†).

D-2.4 Dilute Acetic Acid — 10 percent (*v/v*).

---

*Specification for nitric acid (*first revision*).

†Specification for sodium carbonate, anhydrous (*revised*).

D-2.5 Potassium Iodide

D-2.6 Standard Sodium Thiosulphate Solution — 0·1 N, standardized with potassium iodate or potassium dichromate.

D-2.7 Starch Indicator Solution — One percent (*m/v*), freshly prepared.

D-2.8 Potassium or Ammonium Thiocyanate

D-3. PROCEDURE

D-3.1 Weigh accurately a quantity of the material containing 0·2 g of the active ingredient (copper) into a 500-ml Erlenmeyer flask. Firstly, add 25 ml of water and then 5 ml of concentrated nitric acid carefully to avoid any spurting. If necessary, shake and warm the mixture to effect complete dissolution. Heat this mixture to reduce the volume to a low bulk (about 5 ml). Add 30 ml of water to this dried material and boil for 5 minutes. Remove the flask from the flame, add one gram of urea and boil the mixture again for about 10 minutes. Cool to room temperature and add sodium carbonate in small quantities until a faint permanent precipitate or blue colour is produced. Add dilute acetic acid dropwise until the blue colour or precipitate disappears. If necessary, filter the solution. Add 1·5 to 2·0 g of potassium iodide and titrate immediately the brown solution with the standard sodium thiosulphate solution to a pale straw colour. Add about 2 ml of starch indicator solution and one gram of potassium or ammonium thiocyanate and continue the titration until the blue colour is just discharged.

D-4. CALCULATION

D-4.1 Copper content of the material, percent by mass $= \dfrac{6{\cdot}357\, VN}{M}$

where

V = volume in ml of the standard sodium thiosulphate solution required for the test with the material (*see* **D-3.1**),

N = normality, of the standard sodium thiosulphate solution (*see* **D-5.1** and **D-5.2**), and

M = mass in g of the material taken for the test (*see* **D-3.1**).

D-5. STANDARDIZATION OF SODIUM THIOSULPHATE SOLUTION

D-5.0 General — For standardization of sodium thiosulphate solution, two methods, namely, titration against potassium iodate or potassium dichromate solution have been specified. Either of these two methods may be used for standardization of sodium thiosulphate solution, but the method employed should be stated while expressing the results of a test.

D-5.1 Standardization with potassium iodate

D-5.1.1 *Reagents*

D-5.1.1.1 *Potassium iodate* — to be ground and dried at 105°C for 2 hours immediately before using.

D-5.1.1.2 *Potassium iodide* — iodate free.

D-5.1.1.3 *Starch indicator solution* — one percent (m/v), freshly prepared.

D-5.1.1.4 *Standard hydrochloric acid solution* — approximately 2N, chlorine free.

D-5.1.2 *Procedure* — Weigh, accurately about 0·15 g of potassium iodate and dissolve it in 40 ml water in a conical flask. Stopper securely, shake to dissolve and add 2 g potassium iodide and about 6 ml of standard hydrochloric acid solution. Titrate the liberated iodine with the thiosulphate solution with constant shaking. When reaction is nearly complete, as indicated by pale yellow colour of the solution, dilute with distilled water to about 200 ml. Add 2 ml starch indicator solution and continue titration until the solution becomes colourless.

D-5.1.3 *Calculation*

D-5.1.3.1 Normality (N) of sodium thiosulphate solution $= \dfrac{28{\cdot}04 \times m}{v}$

where

m = mass in g of potassium iodate, and

v = volume in ml of sodium thiosulphate solution required.

D-5.2 Standardization with Potassium Dichromate

D-5.2.1 *Reagents*

D-5.2.1.1 *Potassium dichromate* — dried at 105°C for two hours immediately before using.

D-5.2.1.2 *Standard hydrochloric acid solution* — approximately 2 N, chlorine free.

D-5.2.1.3 *Potassium iodide* — free from iodate.

D-5.2.1.4 *Starch indicator solution* — one percent (m/v), freshly prepared.

D-5.2.2 *Procedure* — Weigh, accurately, between 0·20 and 0·23 g of potassium dichromate and transfer to a 500-ml conical flask fitted with a ground glass stopper. Add 100 ml water and 2 g potassium iodide and shake until the salts dissolve. Add with swirling 10 ml standard hydrochloric acid solution, stopper the flask and immediately place in a dark place for 10 minutes. Titrate the solution with sodium thiosulphate solution. Near the end of the reaction, that is when the solution is yellowish-green in colour, add 1 ml of starch indicator solution. Continue the addition of sodium thiosulphate solution dropwise until the blue black colour formed on the addition of starch indicator solution changes to pale green.

D-5.2.2.1 Carry out a blank determination, using distilled water instead of the potassium dichromate solution, by the same method (**D-5.2.2**). If the potassium iodide is iodate free, the volume of sodium thiosulphate solution used shall be 0·05 ml or less.

D-5.2.3 Calculation

D-5.2.3.1 Normality (N) of sodium thiosulphate solution $= \dfrac{20{\cdot}4\, m}{v_1 - v_2}$

where

m = mass in g of potassium dichromate,

v_1 = volume in ml of sodium thiosulphate solution consumed, and

v_2 = volume in ml of sodium thiosulphate solution consumed for the blank.

APPENDIX E

(*Clause* 3.4.2)

DETERMINATION OF TOTAL SOLUBLE ALKALI

E-1. REAGENTS

E-1.1 Standard Sulphuric Acid — 0·02 N.

E-1.2 Methyl Orange Indicator Solution — 0·1 percent. Dissolve 0·5 g of the indicator in 100 ml of ethyl alcohol (95 percent by volume) or rectified spirit (*see* IS : 323-1959) and make up the volume to 500 ml with water.

E-2. PROCEDURE

E-2.1 Weigh accurately about 25 g of the material into a 400-ml beaker. Add 100 ml of water (freshly boiled and cooled, carbon dioxide-free).

Stir the mixture occasionally and keep for about 30 minutes. Filter and then wash the residue with water several times collecting the washings in the same conical flask as the filtrate. Titrate these total washings (filtrate) with the standard sulphuric acid using methyl orange as the indicator.

E-2.2 Carry out a blank determination on 100 ml of water (freshly boiled and cooled, carbon dioxide-free) plus the quantity of water approximately used for washings.

E-3. CALCULATION

E-3.1 Total soluble alkali (as Na_2CO_3), percent by weight $= \frac{5{\cdot}3\ (V-v)\ N}{W}$

where

V = volume in ml of the standard sulphuric acid required for the test with the material (*see* **E-2.1**),

v = volume in ml of the standard sulphuric acid required for the blank determination (*see* **E-2.2**),

N = normality of the standard sulphuric acid, and

W = weight in g of the material taken for the test (*see* **E-2.1**).

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 kg.m/s^2
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2

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'F' Block, Unity Bldg, Narasimharaja Square	BANGALORE 560002	2 76 49
Gangotri Complex, Bhadbhada Road, T.T. Nagar	BHOPAL 462003	6 27 16
22E Kalpana Area	BHUBANESHWAR 751014	5 36 27
Ahimsa Bldg, SCO 82-83, Sector 17C	CHANDIGARH 160017	2 83 20
5-8-56C L. N. Gupta Marg	HYDERABAD 500001	22 10 83
D-277 Todarmal Marg, Banipark	JAIPUR 302006	6 98 32
117/418 B Sarvodaya Nagar	KANPUR 208005	8 12 72
Patliputra Industrial Estate	PATNA 800013	6 28 08
Hantex Bldg (2nd Floor), Rly Station Road	TRIVANDRUM 695001	32 27

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